MESOZOIC INSECTS OF QUEENSLAND.

No. 2. The Fossil Dragonfly *Æschnidiopsis* (*Æschna*) *flindersiensis* Woodward), from the Rolling Downs (Cretaceous) Series.

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(Plates xlii.-xliii.)

The very interesting, fossil Dragonfly-wing, that forms the subject of this paper, was found associated with the small bivalve Mollusc, *Aucella hughendensis* Eth., in the chocolate-coloured limestone of the Flinders River, North Queensland,* seven miles above Marathon Station This limestone is of Cretaceous age. The fossil was sent to Dr. Henry Woodward, F.R.S., etc., and was described by him (**5**) in 1884 as *Æschna flindersiensis*, "as recognising its locality on the Flinders River, and one of Australia's earliest explorers and heroes."

That the wing did not belong to the recent genus *Æschna*, nor to any recent subfamily, was obvious enough from Woodward's own figure. In 1908, Handlirsch, who had never seen the fossil itself, removed it to the extinct family *Æschnidiidæ* (**2**), and placed it in the genus *Æschnidium*.

Wishing to study this insect, I wrote some years ago to the Director of the Queensland Museum, to try and find its whereabouts. He soon satisfied me that it was not in the Museum Collection. Inquiries from Mr. Dunstan, Chief Government Geologist of Queensland, at the Geological Survey, elicited the

* The locality is not far from the town of Hughenden, and is now classed as Western Queensland; it lies almost exactly half-way along a North-South line drawn from Cape York to the New South Wales border.

fact that nothing was known of it there. I wrote, therefore, to the British Museum authorities for information, and was informed that the fossil had undoubtedly been returned by Dr. Woodward to the Queensland Geological Survey Collection; where it was ultimately found, without a label, in an accumulation of odd specimens.

The rock-specimen, on which a number of fragments of *Aucella* are plainly visible, is hard, dark greyish-brown, and moderately finely grained. The dragonfly-wing lies upon a fairly even plane of fracture, and has its apical third, or a little more, and also a small piece of the broad anal area at the base, cut off by two parallel fractures of the rock running obliquely across the wing. Unfortunately, a further irregularity in the fracture-plane has extended up from the posterior margin near the base, well into the middle of the wing, and has thus removed a considerable amount of the interesting area lying below the triangle, as can be seen in the photographs on Plate xlii.

The description and figure given by Dr. Woodward, in 1884, may be described as broadly accurate, as far as the requirements of the day were supposed to go, with the exception of a few misstatements which should have been avoided, even by one who claimed no special knowledge of Dragonfly Wing-Venation. For instance, in describing the main veins or "nervures" of the anterior border of the wing, we are told that the "costal nervure," the "sub-costal," and the "median" (in modern terminology, C, Sc, and R) "pass along the anterior border until they reach the '*node*,' or cubital point"; after passing which, only the two anterior ones "are continuous to the extremity of the wing, and support the pterostigma." Now this is not true of any Dragonfly, for it is, in every case, the *first* and *third* of these veins (C and R) that run past the nodus and support the pterostigma. Further, in the fossil under discussion, it is less than ever true, for it is easily seen that, in this case, *all three* of these veins appear to pass the nodus, and Woodward's own figure shows them so doing. Again, it is somewhat puzzling to be told, on p.338, that the fossil is "perhaps referable to the subfamily

Gomphinæ," and to have it placed, on p.339, in the genus *Æschna*; since, long before 1884, the two subfamilies *Æschninæ* and *Gomphinæ* had been clearly recognised and distinguished.

However, Woodward got very close to the mark, as regards the true relationships of this fossil wing, when he noticed its close resemblance to a fossil wing found in the Lower Purbecks of Durdlestone Bay, Dorset, England, and figured by Prof. J. O. Westwood (**4**) in 1854. Though Woodward does not mention the name of this specimen, there can be little doubt that he referred to *Æschnidium bubas* Westwood, a form so similar to the more complete *Æschnidium densum* Hagen, that Handlirsch thinks that the two may very well be specifically the same.

Woodward's figure (**5**, Pl. xi., fig. 1) shows a wing undoubtedly belonging to the *Æschnidiidæ* in its general features, but apparently differing from the type-genus, *Æschnidium*, in some important points, notably in the extraordinary, transversely narrowed triangle, the incomplete arculus, and the weakly-formed nodus. These points are so important that, if the fossil really agrees with Woodward's figure, it would be impossible to endorse Handlirsch's removal of it to the genus *Æschnidium*. It would be necessary to propose a new genus for its reception. Hence, in making a careful study of the wing, I have paid special attention to these three important areas, with the results that I now propose to give in this paper.

It is necessary to state, first of all, what is the degree of preservation of the fossil wing, and, in particular, of the small veinlets and areolets that cover it so abundantly. The rock on which the wing is impressed is very hard. The outlines of the main veins, and their concavity or convexity, are preserved to perfection. On the other hand, the finer veinlets and areolets are not thus perfectly preserved, yet they can be seen to be present in all parts of the wing. It may be stated that every polygonal areolet is preserved in such a way that its *interior* is indicated on the rock as a small depression, while the veins, that form its periphery, are not usually clearly marked (except only in the case of cross-veins passing direct from one main vein to another); so that, if one attempts to draw the outline of a cell under the camera lucida, its exact shape and position depend partly upon the direction of light. In order to show up these areolets, it is necessary to use very oblique light. Consequently, if the light be directed from the right side of the areolet, the dividing lines between light and shade (which are the lines that give us the rough outline of the cell) will lie too far to the right; while, with light directed from the left, they will lie too far to the left. That this is so, I easily proved by drawing a typical areolet or two, with two or more different lightings, when the outlines of the cells did not wholly coincide. Therefore, in all important cases, it was essential to make at least two drawings, and to gauge the true outline of the cell as a middle position between them. By this somewhat laborious method, I hope that I have succeeded in obtaining a more accurate result of the details of this wing than would otherwise have been possible.

The general appearance of the fossil is seen from the two photographs in Plate xlii. In Fig.9,* the light was directed on to the fossil from the left, or basal side, at an angle of about 20° to the plane of the wing. In fig.10, the light was similarly directed from the right or distal side. A comparison of the two figures shows the strong convexity and concavity of the veins very clearly. The following are the convex veins:—C (very slightly), R + M to arculus, R beyond arculus, Ms, M_4, A and all its descending branches, and the distal side of the triangle.

The following are the concave veins:—Sc, its apparent continuation beyond the nodus, the nodus itself, the subnodus and its continuation Rs; M_1, M_2, M_3, Rspl, Mspl, Cu, and the anterior and proximal sides of the triangle.

It will be seen from this, that the plane of the triangle is not horizontal, but inclined upwards distally, so that this area

* The numbers of the figures and text-figures in this series of papers are made concurrent from one paper to another. In No.1, the figures in Pl. ix. were inadvertently left unnumbered; the forewing of *Archipanorpa magnifica* should have been fig.7, the hindwing fig.8. Fig.9 of Pl. xlii. in this paper follows on consecutively.

catches the light directed from the base (Plate xlii., fig.9) but lies in deep shade when the light is directed from the distal side.

It should also be noticed that the numerous convex branches of A are separated by concave supplements. None of these are true branches of A, for it can easily be seen that they are all incompletely formed as they approach A from below. Woodward's figure shows this fairly well, but an examination of the actual fossil (Plate xlii., fig.10) shows, along the broken-off edge below and proximad from the triangle, how very marked this alternate convexity and concavity really is.

The *costa* (C) is much thickened at the base, for a distance of about 2 mm.; there are only very faint indications of the typical "ribbing" of this vein. For most of its length, it appears to be a rather weak vein, very little stronger than Sc. Between C and Sc, a parallel supplement (Cspl) is developed, beginning weakly just above the arculus, and continuing more strongly right to the nodus. This is not shown at all in Woodward's figure. The cross-veins between C and R are mostly weak and irregularly placed; but two complete ones can be made out, which are shown slightly thickened in Plate xliii., fig.11. These probably represent the two hypertrophied antenodals of recent *Æschnidæ.* Beyond the nodus, there is only a much fainter indication of a corresponding supplement, though Woodward figures this as if it were quite obvious.

The *subcosta* (Sc) is very plainly marked, lying in a moderate furrow from base to nodus. At that point, it *appears* to divide into three, one branch turning sharply upwards to join the costa, a second running straight on through the nodus, parallel to and between C and R, and a third turning obliquely downwards to meet R at the subnodus. The actual structure of these three veins will be fully discussed when we come to deal with the nodus itself.

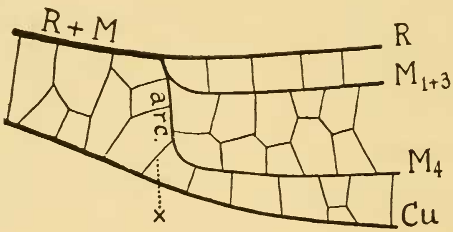
The *radius* (R) and *media* (M) appear to be very slightly separated at the extreme base of the wing, but fuse together almost immediately, and continue to the arculus as a single, thick, convex vein, R + M. Thence onward, R runs almost straight—actually with a very slight double-curving—below and parallel to C and Sc. The question of the formation of the *radial sector* (Rs) must be dealt with under the discussion of the nodus.

The *media* (M) divides at the arculus into the concave and weak M_{1+3}, and the stronger, convex vein, M_4. At a point a little beyond the distal end of the triangle, M_{1+3} divides into M_{1+2} above, and M_3 below, both weakly formed and concave. Immediately afterwards, M_{1+2} gives off, posteriorly, a strong concave vein, corresponding with the *bridge-vein* of recent Anisoptera. This vein, for the reasons given below in my discussion of the nodus, I have definitely decided to call the *Zygopterid sector* (Ms). It runs parallel to, and a little below, M_2. M_{1+2} divides into M_1 and M_2, just before these two veins are crossed by the vein descending from the subnodus, as Woodward's figure accurately shows. Below Ms, there is a slight indication of the formation of a *radial supplement* (Rspl). M_4 runs from the arculus to the upper distal angle of the triangle, and, from there on, curves gently downwards, beneath and subparallel to Ms, to reach the posterior wing-border far beyond the level of the nodus. Beneath M_4, a very long, *median supplement* (Mspl) is developed, lying slightly concave to M_4, but not linked up with the triangle (as would appear from Woodward's figure).

The *cubitus* (Cu) is a fairly strong, concave vein, running, with a very slight double-curving, below the arculus, to join the triangle at its proximal angle. There it turns sharply downwards, at right angles to its previous course, forming the proximal side of the triangle itself. Its further course is unfortunately lost, owing to the fracture below the triangle, already mentioned. But, at the distal side of this fracture, it is easy to pick up again a strongly concave vein descending to the wing-border almost directly under the nodus. This must certainly be Cu_1; but where Cu_2 is, or whether it is present at all, is not so easy to determine.

The *analis* (A) is a very strongly-marked, convex vein, running in a gentle curve (concave to the costa) from the base to the proximal angle of the triangle, where it meets Cu. I can find no absolutely satisfactory evidence of the existence of an *anal crossing*; but the oblique vein descending from Cu just below the arculus, to meet A at the point where A_3 descends from it, may possibly represent this vein. If we reckon the distal portion of A, which links up with Cu, and forms the upper side of the large subtriangle, to be a secondary formation (as in recent Anisoptera), we can call the seven clearly-marked, convex, descending branches A_1, A_2, etc., to A_7. There may be one or two more similar branches in the narrow anal portion of the base, that is missing in the fossil.

We can now proceed to discuss the three most important areas of the fossil wing, viz., the *arculus*, the *triangle*, and the *nodus*.



Text-fig.8.
Æschnidiopsis flindersiensis (Woodward), hindwing; region of arculus; (× 12½).

The *Arculus* (Text-fig.8).

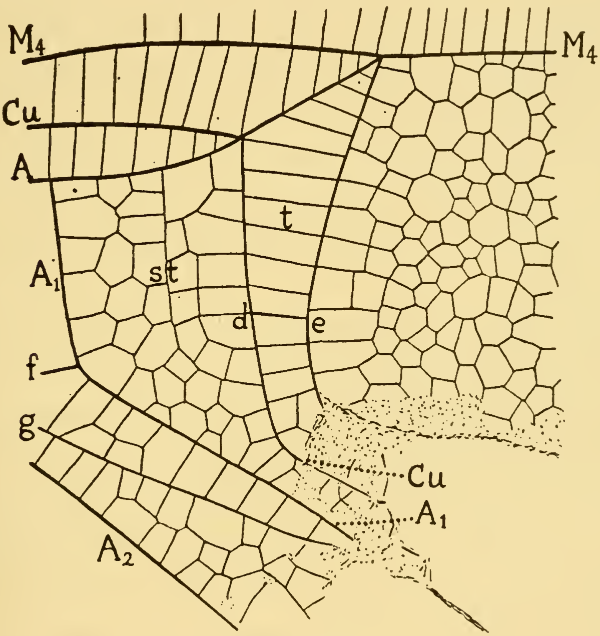
This area is very beautifully preserved, so that a little care in arranging the lighting allows us to draw every cross-vein in its exact position. The arculus itself exhibits two very primitive features to perfection:—

(*a*) It is incomplete posteriorly, the cross-vein (x) destined to complete it having not yet fully taken up its position.

(*b*) The upper sector of the arculus (M_{1+3}) leaves the main stem of M very close under R, as in the recent *Thorinæ*.

As a contrast to this, the actual angle made by M_4 with R is greater than that seen in many recent Dragonflies, being very nearly a right-angle. Woodward's figure makes this angle much too small, and is also inaccurate in showing the two sectors of the arculus as if they came off separately from R.

If Handlirsch's figure of *Æschnidium densum* Hagen, is correct, that dragonfly had a much more specialised form of arculus; so that the differences between it, and the species under discussion, would alone be sufficient to admit of placing the latter in a new genus.



Text-fig. 9.
Æschnidiopsis flindersiensis (Woodward), hindwing; region of triangle; (× 12½).

The *Triangle* (Text-fig. 9).

The anterior portion of the triangle and its broad supporting subtriangle are very well preserved. Unfortunately, as we follow these structures posteriad, their formation becomes less easy to make out; and, finally, just at the extreme posterior end of the triangular region, the fracture already mentioned cuts us off from completing our survey. Woodward, in his figure, traces the veins, called by me A_1 and A_2, across this fracture, together with two interpolated supplements. This is quite unjustifiable, particularly as he makes both these veins, which, before crossing the fracture, are strongly convex, pass, on reaching the other side, into veins which are *quite as strongly concave*, and which, therefore, if they are parts of the main veins at all, and not mere supplements, must belong to Cu. The only ridgings that can be seen running across the area of bare rock forming the fracture are shown by dotted lines in Plate xliii., fig.11. As these are continued far beyond the posterior border of the wing, and as similar, though not quite so plain, ridgings can be made out in the area beyond the costal margin of the wing, I can only conclude that they are part of the structure of the fracture, or of the grain of the rock, and have nothing whatever to do with the wing itself.

The *triangle* itself is certainly the most remarkable structure of the kind known in the hindwing of any Anisopterous Dragonfly, owing to its intense narrowing in a transverse plane. Its shape, taken in conjunction with its broad and somewhat quadrangular subtriangle, at once suggests a comparison with the same structures in the *forewings* of the most highly-developed recent *Libellulidæ*. The two formations are certainly parallel; but, as we cannot trace out the course of the cubitus and its branches with certainty in our fossil, it does not seem possible to institute a detailed comparison.

Text-fig.10 shows the actual shape of the triangle and subtriangle. In Woodward's figure, the shape of the triangle is not quite correctly indicated, and it is made to appear wider anteriorly than it really is. Further, the long, distal side is not so curved as in Woodward's figure; and the short, upper side is *absolutely straight*, with both Cu and A meeting it together at its extreme, proximal end. The cross-veins in the triangle itself are all simple and subparallel, and are more numerous than would appear from Woodward's figure. One of these cross-veins, the seventh from the basal to the distal side, is very clearly visible in whatever direction the light may be arranged, and is evidently much thicker than the others. Further, it is very distinctly concave. It would seem, therefore, very likely that this vein is really part of Cu_1, so that the forking of the cubitus takes place at the posterior basal angle of the triangle (the point *d* in the figure). If this be so, then the continuation of the proximal side must be Cu_2; while Cu_1, after leaving *d*, crosses to meet the long distal side at the point *e*, where it turns sharply downwards to continue the line of that side posteriad. It must be noted, however, that this continuation remains highly convex. In all recent Anisoptera, Cu_1 remains concave throughout its length, whereas Cu_2 becomes convex after leaving the triangle. That the convex vein does not continue to the wing-border in our fossil, is quite evident, since, on the other side of the fracture, one finds a strongly concave vein running to the border, just in the usual position for Cu_1. We have, therefore, two alternatives: either (*a*) if the cubital fork is at *d*, then the local convexity of Cu_1 just below the triangle must be attributed to the influence of the strong distal side of the triangle dominating it for some distance, though it soon sinks into the usual concavity; or (*b*) the vein *de* may be only a strengthened cross-vein, and the distal side may continue below it to meet the proximal side at some point just within the obliterated area, so that the triangle is really triangular, and not quadrangular; if so, then the cubital fork is at this latter point, and the two branches of Cu may very well possess their usual characters from the very start. A study of Handlirsch's figure of this part of the hindwing of *Æschnidium densum* Hagen, (**2**, Atlas, Plate xlvii., fig. 16) fails to help us here, though it is quite likely that an examination of the actual fossil might give us the necessary clue. Thus the actual shape of the triangle, and the position of the cubital fork in our fossil, must remain doubtful. It is, indeed, just possible that the triangle may remain open posteriorly, as the subtriangle appears to do also in this remarkable wing-form.

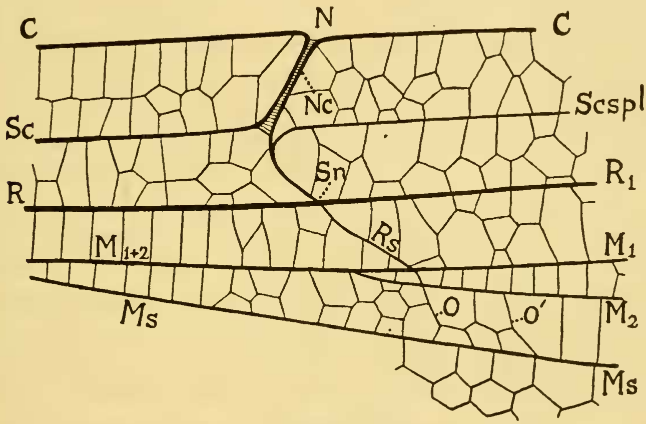
The *subtriangle* is a wide, irregularly quadrangular area, bounding the triangle proximally, and enclosed by a continuation of A above (this must be a specialised cross-vein, if the formation is the same as in recent Anisoptera), A_1 proximally, and the bent-down portion of Cu distally. Posteriorly, the area is narrowed by the converging of A_1 towards Cu; but whether they ever meet, so as to complete the closure of the subtriangle, there is unfortunately not quite enough of the wing preserved to show us. At the edge of the fracture, Cu appears definitely to have turned, so as to run closely parallel to and above A_1; so that the chances are that this area is not closed off posteriorly by any strong vein. Within the subtriangle, a number of small, irregular, polygonal areolets form a close meshwork, four cells wide in the broadest portion. Proximally, the subtriangle itself is supported by two struts, *f* and *g*, formed by alignment of the boundaries of numerous cellules. Of these, *f* passes from A_2 to A_1 almost at right angles, meeting the latter at its bend; while *g* is much longer and very oblique, meeting A_1 just on the edge of the fracture.

Distally from the triangle, there lies a broad area containing a very large number of small, irregular, unspecialised, polygonal cellules. As far as I can make these out, they are much more numerous than Woodward's figure would indicate; and I can find only the slightest traces of the supplements indicated by him as descending obliquely from the most proximal portion of Mspl; nor is that part of Mspl itself at all evident. Plate xliii., fig.11, shows more accurately the appearance of this area.

The *Nodus* (Text-fig.10).

This area is very well preserved, on the whole; but, unfortunately, the nodus itself is a weak formation, so that its exact structure is not easy to determine. I have studied it under oblique light from several different directions. A correlation of the drawings obtained in this manner gives the result shown in Text-fig.10, which, I think, is as accurate as we can hope to get.

Approaching the nodus, the costal vein is not strongly formed, and shows practically no sign of "ribbing." At the nodus itself, the break in the costa is not very strongly marked, but is evident from the sudden drop in level. Examination in certain lights shows the presence of *two* distinct veins, both weakly formed, bounding the nodal furrow, one on either side. Of these, the proximal is the upturned end of Sc, the distal is the *nodal cross-vein* (*Nc*). This latter is prolonged below Sc, for a short distance, before it receives the downwardly-arching end of the *subcostal supplement* (*Scspl*), or vein which appears to form a prolongation of Sc beyond the nodus. That there is a distinct gap



Text-fig. 10.
Æschnidiopsis flindersiensis (Woodward), hindwing; region of nodus and radial sector; (× $12\frac{1}{2}$).

between Sc proper, proximal to the nodus, and Scspl distal from it, can be clearly seen, so that the second branch of Sc spoken of, on p.680, as apparently running straight through the nodus, does not really exist at all. It can also be seen, that the supposed third branch mentioned on the same page is non-existent, being none other than the downward production of the nodal cross-vein itself, which curves round, posteriad and distad, to meet R at the *subnodus* (Sn). At this point the vein, which is clearly the true Radial Sector (Rs) comes off posteriad from R, and shows a slight curving close to its origin. This Rs crosses from R to M obliquely, reaching the latter *just after it has divided into* M_1 and M_2, and crosses over both these branches. It then becomes a very weakly-formed vein, which drops less obliquely towards Ms, but fails to reach it, being caught up at the upper proximal angle of a small, but clearly-marked, trapezoidal cellule standing upon Ms itself.

This formation certainly supports the theory, advanced by me in a previous paper, concerning the true nature of the Bridge in Anisoptera (**3**)—written before I had seen this fossil—except in one particular. I suggested that, in the Anisoptera, trachea Ms "becomes hitched on to Rs," so that the bridge itself represents, in the imaginal venation, the original course of Ms, while its distal prolongation beyond the oblique vein (this latter represented in our fossil by the piece of Rs lying below M_2) represented Rs (*l.c.*, pp.883-4). Now, in our fossil wing, Rs practically fails to reach Ms, so that the natural interpretation of the venation is that not only the bridge itself, but also its continuation right to the wing-border, belongs altogether to Ms, while Rs only forms the subnodal vein between R and M_1, the minute crossing between M_1 and M_2, and the *incomplete oblique vein* (O) descending towards Ms, but failing to reach it. A very little advance in specialisation in this latter region would straighten out the lower end of Rs, so that the oblique vein would appear completed, as in all recent Anisoptera.*

Woodward's figure correctly shows the point of crossing of Rs over M, and its failure to reach Ms, but quite fails to give the peculiar and distinctive features of the nodus itself, and the dense structure of the cellular meshwork in that region.

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* It is possible that Rs actually continues along the zigzag between M_2 and Ms for three cellules' distance, so that, if further evolution simplified this part to single cross-veins, the slanting vein marked O′ in the figure might appear as an "oblique vein." This process might account for the carrying on of the oblique vein far beyond the level of the nodus in *Æschnidium*, and in many recent Anisoptera.

We may summarise the chief points of interest in this region of the wing as follows:—

(1) The nodus is fully formed, but weak.

(2) The subnodus is also complete.

(3) The apparent prolongation of Sc through the nodus is of the same nature as that seen in *Telephlebia*, i.e., due to the secondary formation of a supplement between C and R, by alignment of the boundaries of numerous cellules of the dense meshwork to form a *subcostal supplement*, Scspl; but, in the fossil, this Scspl is completely formed, whereas, in *Telephlebia*, it is of only about two cellules' length.

(4) Supplements similar to Scspl, and due to the same cause, are formed proximally to the nodus, between C and Sc, and distally from the nodus, between C and Scspl; but the latter of these does not reach back proximally to the nodus (see Plate xliii., fig.11).

(5) Rs arises from R directly under the subnodus. It is a weak vein, running obliquely to M, crossing M_1 and M_2 not far distad from their point of union, and then dropping towards Ms as the incomplete, oblique vein O.

It will be seen that, if this fossil gives us the right interpretation of the structure of Rs and Ms, the distinction between the Anisoptera and Zygoptera in this region almost disappears. The only difference would be that, in the former, trachea Rs has become strengthened by capturing Ms, so that the basal part of the latter (the bridge) has become aborted; while, in the latter, it continues to weaken, and fails ever to cross M_{1+2}.

Classification of the Fossil Wing.

As long as we decide to keep to the old classification of the Anisoptera, in which only two families are recognised (the *Æschnidæ* and the *Libellulidæ*), it seems to me that we cannot grant full family-rank to the *Æschnidiidæ*. These latter have the triangles of the fore- and hindwings alike (both being elongated transversely to the wing-axis), and the antenodals of the first and second series not corresponding. Hence they are, within the broad definition of that family, true *Æschnidæ*. I propose, therefore, to regard Handlirsch's family *Æschnidiidæ* as only a subfamily, *Æschnidiinæ*, within the family *Æschnidæ*, and of equivalent rank with the subfamilies *Petalurinæ*, *Cordulegastrinæ*, and *Chlorogomphinæ*. This last group, I consider to be the nearest living type to the fossil *Æschnidiinæ*, owing to the shape of its triangles.

At present, the fossil wings (Jurassic and Cretaceous) assigned to the subfamily *Æschnidiinæ* are all comprised within the single genus *Æschnidium* Westwood. I now propose to separate out the Queensland fossil wing as the type of a distinct, new genus, *Æschnidiopsis*, according to the following Table:—

Subfamily ÆSCHNIDIINÆ.

Key to the Genera.

Arculus complete posteriorly; triangles not excessively narrowed transversely to the wing-axis ....Genus *Æschnidium* Westwood.
(Jurassic, Europe). Type, *Æschnidium bubas* Westwood. (Lower Purbecks, Durdlestone Bay, England).

Arculus incomplete posteriorly; triangle of hindwing excessively narrowed and elongated transversely to the wing-axis ....
.........Genus *Æschnidiopsis*, n.g.
(Cretaceous, Australia). Type, *Æschna flindersiensis* Woodward. (Flinders River Beds, N. Queensland).

ÆSCHNIDIOPSIS, n.g.

Large Dragonflies (hindwing about 40 mm. long) with exceedingly dense reticulation, as in *Æschnidium*. *Nodus* completely formed, but weak; *subnodus* also present. Rs arises at the subnodus, crosses M_1 and M_2 just distad from their point of union, and drops towards Ms as an incomplete, oblique vein. (In *Æschnidium*, as figured by Handlirsch, the oblique vein is complete in the hindwing, and lies far distad from the nodus). *Arculus* strongly formed, but incomplete posteriorly; M_{1+3} leaving it very close up to R; M_4 lying well below M_{1+3}, separated from the latter by two rows of cellules. *Triangle* of hindwing very long, and excessively narrowed transversely to the wing-axis; crossed by a number of simple, subparallel cross-veins;

either quadrangular in form (closed posteriorly by the thickened cross-vein *de* of Text-fig.9), or open posteriorly; far removed from arculus. *Subtriangle* broad, quadrangular, filled with a meshwork of irregular cellules; probably narrowly open posteriorly. Mspl well-developed, slightly concave to M_4. Rspl apparently fairly well-developed. *Anal crossing* not clearly indicated. *Anal vein* with at least seven, well-formed, convex, descending branches in hindwing, subparallel, separated by concave supplements.

Type, *Æschna flindersiensis* Woodward.

ÆSCHNIDIOPSIS FLINDERSIENSIS (Woodward).

Æschna flindersiensis Woodward, Geol. Mag., New Series, Dec. iii., Vol. i., No. viii., 1884, pp.337-339, Plate xi., fig.1.

Æschnidium flindersiense Handlirsch, Die fossilen Insekten, p.667.

Total length of specimen (hindwing) measured along the radius, 22·5 mm. *Greatest breadth* (at level of origin of Ms), 12·6 mm. Probable total length of wing, about 40 mm.

Description as given in this paper.

Locality.—Flinders River Beds (Cretaceous), N. Queensland.

Type in Coll. Queensland Geol. Survey, Brisbane, Q.

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3. TILLYARD.—"Further Researches upon the Problems of the Radial and Zygopterid Sectors in the Wings of Odonata, and upon the Formation of Bridges." Proc. Linn. Soc. N. S. Wales, 1916, Pt. 4, pp. 871-887. (See p.883).
4. WESTWOOD.—Quart. Journ. Geol. Soc., x., 1854, pp.387, 393, Plate 15, fig.5.
5. WOODWARD.—"On the Wing of a Neuropterous Insect from the Cretaceous Limestone of Flinders River, North Queensland, Australia." Geol. Mag., New Series, Dec. iii., Vol. i., No. viii., 1884, pp.337-339, Plate xi., fig.1. (*Æschna flindersiensis*).

EXPLANATION OF PLATES XLII.-XLIII.

Plate xlii.

Figs.9-10.—*Æschnidiopsis flindersiensis* Woodward, hindwing; photographed by strong oblique, artificial light; (×4). In Fig.9, the light is directed from the left; in Fig.10, from the right.

Plate xliii.

Fig.11.—*Æschnidiopsis flindersiensis* (Woodward), hindwing; (×6). Camera lucida drawing to show full details of venation.

Lettering for Plates and Text-figures.

A, analis; A_1-A_7, its descending branches; *arc*, arculus; C, costa; Cu, cubitus; Cu_1, Cu_2, its branches; *de*, thickened cross-vein in triangle; *f*, *g*, struts supporting subtriangle; M, media; M_1-M_4, its branches; Ms. Zygopterid sector; Mspl, median supplement; N. nodus; Nc, nodal cross-vein; O, oblique vein (incomplete); O′, possible second oblique vein; R, radius; R_1, its main stem; Rs, radial sector; Rspl, radial supplement; Sc, subcosta; Scspl, subcostal supplement; Sn, subnodus; *st*, subtriangle; *t*, triangle; *x*, cross-vein tending to complete arculus posteriorly.